TABLE OF CONTENTS OF APPELLANT'S APPENDIX (Continued).

	Vol. 2 Page
Thomas S. Martin—	
Direct-Examination	449a
Cross-Examination	452a
Re-Direct Examination	455a
Re-Cross-Examination	455a
Discussion	455a
Sixth Day.	
Discussion	457a
Seventh Day.	
Discussion	483a
Address to Jury by Plaintiff's Counsel	486a
Address to the Jury by Defendant's Counsel	509a
Rebuttal Address to the Jury by Plaintiff's Counsel	527a
Charge of the Court	531a
Discussion	548a
Verdict	560a
Plaintiff's Points for Charge	562a
Plaintiff's Supplemental Points for Charge	572a
Defendant's Points for Charge	572a
Plaintiff's Exhibit No. 36	576a
Plaintiff's Exhibit No. 39	580a
Motion for Directed Verdict Under Rule 50	582a
Judgment	583a
Motion for New Trial	584a
Plaintiff's Supplementary Motion for New Trial	587a
Deposition of Francis J. Lawlor	588a
Opinion	598a
Plaintiff's Notice of Appeal	618a
Plaintiff's Exhibit No. 2	619a
Plaintiff's Exhibit No. 3	620a
Plaintiff's Exhibit No. 7	621a
Plaintiff's Exhibit No. 8	622a
Plaintiff's Exhibit No. 9	623a
Plaintiff's Exhibit No. 18	624a
Plaintiff's Exhibit No. 23	625a

Locomotive Cyclopedia

Of American Practice

Definitions and Typical Illustrations of Railroad and Industrial Locomotives, Their Parts and Equipment; also Locomotives Built in America for Operation in Foreign Countries—

Including a Section on

LOCOMOTIVE SHOPS AND ENGINE TERMINALS

Tenth Edition—1938

Compiled and Edited

for the

Association of American Railroads—Mechanical Division

Compiled and Edited

for the

Association of American Railroads—Mechanical Division

EDITOR
ROY V. WRIGHT
Managing Editor, *Railway Age* and
Editor, *Railway Mechanical Engineer*

MANAGING EDITOR
ROBERT C. AUGUR
Managing Editor, *Car Builders Cyclopedia* and
Associate Editor, *Railway Mechanical Engineer*

EDITOR—SHOP SECTION
H. C. WILCOX
Associate Editor, *Railway Mechanical Engineer*
and *Railway Age*

ASSOCIATE EDITOR
H. P. FOSTER

A.A.R. GENERAL ADVISORY COMMITTEE

W. I. CANTLEY, Mechanical Engineer
A.A.R., Mechanical Division

R. G. BENNETT, Gen. Supt. Motive Power
Pennsylvania Railroad

K. CARTWRIGHT, Mechanical Engineer
New York, New Haven & Hartford R. R.

J. E. ENNIS, Engineer Assistant
New York Central System

A.A.R. ADVISORY COMMITTEE—SHOP SECTION

B. P. PHELPS Engineer of Shop Extension
Atchison, Topeka & Santa Fe Ry. System

V. P. SCHMIDT, Assistant Engineer,
Pennsylvania Railroad

J. I. STEWART, Supervisor Shop Machinery & Tools,
New York Central Railroad

Published and Printed in U. S. A.
By
Simmons-Boardman Publishing Corporation
30 Church Street, New York, N. Y.

Chicago, Ill.
105 West Adams St.

Cleveland, O.
Terminal Tower

Washington, D. C.
1081 National Press Bldg.

Seattle, Wash.
1038 Henry Bldg.

San Francisco, Calif.
485 California St.

Los Angeles, Calif.
530 W. Sixth St.

Helical Springs. Section 14.

Helper. A term used to designate a helper engine for trains.

High Pressure Control (Air Brakes). See DOUBLE PRESSURE CONTROL.

High Pressure Exhaust Pipe. See RECEIVER PIPE.

High-Speed Brake (Air Brakes). A brake equipment consisting of the ordinary quick action brake with the addition of a few attachments, the principal one being an automatic pressure reducing valve which is attached directly to the brake cylinder. The auxiliary reservoir pressure is increased from 70 to 110 pounds, and in emergency applications a pressure of about 85 pounds is obtained in the brake cylinder. This high pressure is slowly bled off through the reducing valve to 60 pounds. The operations of release and recharging take place as in the ordinary quick action brake. For vehicles operating in a high speed braked train and not equipped with the high speed reducing valve, a safety valve is required. Not now generally applied. See AIR BRAKE. Section 12.

Hinge. A hook or joint on which a door, gate, etc., turns. They are provided with a tube-like knuckle through which the hinge pin passes. The common door hinge is usually a butt or butt hinge. The strap hinge is a common form of rough hinge for heavy doors, cab aprons, tank manhole covers, etc. A T-hinge is a combination of the butt and strap hinge.

Hinge Pin. The pin passing through the knuckle of a hinge and holding the two parts together.

Hip Joint. The joint between the roof sheet over the firebox and the shell of a boiler with a Belpaire firebox.

Hip Joint Casing. A sheet steel cover flanged and pressed to the shape of the hip joint and forming part of the jacket of a boiler with a Belpaire firebox. See JACKET.

Hoe. A fire tool or implement consisting of a short broad blade with a long handle at right angles to it, used

Hose Collar. A collar which surrounds the hose and binds it on the nipple. Also called hose band.

Hose Coupling (Air Brake). A contrivance for coupling or connecting the ends of a pair of brake hose together, so that the air by which the brakes are operated can pass from one vehicle in a train to another. The couplings for train air signal apparatus are similar to brake hose couplings, but are arranged so that they will not couple to them. Section 12.

Hose Nipple (Air Brake). A short iron tube fitting into the end of the brake hose and fastened by a suitable clamp and screws. One end is threaded and screws into the angle cock.

Hub (Wheels). The central portion into which the axle is fitted. It is usually cylindrical in form and projects beyond the disks or spokes of the wheel on each side. In Great Britain termed the boss.

Hub Liner. See DRIVING BOX HUB LINER, JOURNAL BOX HUB LINER.

Hub Plate. See DRIVING BOX LINER.

Hudson Type Locomotives (4-6-4). A locomotive having a four-wheel leading truck, three pairs of coupled driving wheels and a four-wheel trailing truck. First used on the New York Central in 1927.

I

I-Beam. A general term applied by makers to any form of rolled iron or steel having an I cross-section. The top and bottom parts are termed the flanges, and the middle the web. When one of the flanges is simply a round bar it is termed a deck beam. I-beams are used for center and intermediate sills, also for body and truck bolsters on tenders.

Independent Brake Valve (Air Brake). A rotary, straight-air brake valve used with the Westinghouse ET locomotive brake equipment for operating the locomotive brakes independently of the train brakes. See ENGINEER'S BRAKE VALVE. Section 12.

India Rubber. A gum which exudes from certain tropi-

firebox and the shell of a boiler with a Belpaire firebox.

Hip Joint Casing. A sheet steel cover flanged and pressed to the shape of the hip joint and forming part of the jacket of a boiler with a Belpaire firebox. See JACKET.

Hoe. A fire tool or implement consisting of a short broad blade with a long handle at right angles to it, used for raking a fire or pulling ashes out of an ashpan.

Holder. Something by which a thing is held. A great variety of parts which serve this purpose are so called, as door holder, lamp holder, etc.

Holder-On. See PNEUMATIC HOLDER-ON.

Hollow Staybolt. A staybolt with a small hole lengthwise through the center.

Hood. A roof apron which is attached to the back end of a cab and extends out over the cab apron to protect the firemen. See FIREDOOR HOOD.

Hook. A fire tool consisting of a long handle with a hook at one end used for raking or spreading fires.

Hopper (Extended Smokebox). A receptacle for cinders or sparks on the under side of a smokebox. It is shaped like the frustum of a cone or a pyramid, and empties into the CINDER PIPE, which see. Also called cinder pocket and spark pocket.

Horsepower. A term used as a measure of power. One horsepower is equivalent to a force that will raise 33,000 pounds one foot in one minute.

Hose. Tubing made of rubber and canvas, and rubber, metal and canvas, or of interlocking spiral metallic sections. Used on locomotives for conveying air, steam, oil or water. See AIR BRAKE HOSE.

Hose Clamp (Air Brake). A clamp to bind the hose to the hose nipple and coupling.

bolsters on tenders.

Independent Brake Valve (Air Brake). A rotary, straight-air brake valve used with the Westinghouse ET locomotive brake equipment for operating the locomotive brakes independently of the train brakes. See ENGINEER'S BRAKE VALVE. Section 12.

India Rubber. A gum which exudes from certain tropical trees growing in the East Indies, Mexico, South America, etc. It is prepared for use by vulcanizing with a greater or less proportion of sulphur, according to the stiffness required.

Indicator. A device attached to the cylinder of a steam engine, which gives a graphical diagram of the steam distribution in the cylinder at all points in the stroke. Used chiefly for testing purposes. Also called Steam Engine Indicator.

Indicator Apparatus. See LOCOMOTIVE TESTS.

Indicator Fitting. A brass fitting with a three-way cock and pipe connections for an indicator from each end of the locomotive cylinder.

Indicator Plug. A plug screwed into a hole in the side of a cylinder near the end. When the indicator is to be used, this plug is removed and the indicator pipe connection screwed in. A hole is drilled near each end of a cylinder so that an indicator diagram may be taken from either end at will.

Industrial Locomotives. Section 17.

Injector. A device for forcing water into a steam boiler in which a jet of steam imparts its velocity to the water and thus forces it into the boiler against the boiler pressure. In addition to injectors operated by live steam, injectors operated by exhaust steam are also available. See INSPIRATOR. BOILER INSPECTION. Section 4.

SUPPLEMENTAL APPENDIX.

Diesel-Electric Locomotive

By

Charles F. Foell

and

M. E. Thompson

Editor

DIESEL POWER

AND

DIESEL TRANSPORTATION

Published

by

DIESEL PUBLICATIONS, INC.

192 Lexington Ave., New York 16, New York

Since practically every user has established his own standards of wheel and axle maintenance, as is the case for many other items about the locomotive, the I.C.C. regulations are regarded as minimum standards in many instances.

Air Brakes

GENERAL.—The air brake, throughout its long history, has made possible the combination of "speed with safety." Modern brakes are rapid and positive in their action, and are applied as required by a few, simple movements on the part of the locomotive operator.

The purpose of all air brakes is controlled deceleration and stoppage of the locomotive and attached cars, if any. The basic principle of operation is the same for all brake styles, but the mechanical details vary from style to style.

BRAKE STYLES.—The elementary distinction between air brakes is found in the terms "independent," or "straight," and "automatic." The former refers to the system that controls the application of the brakes on the locomotive itself. The latter refers to the simultaneous application of locomotive brakes and train brakes, through the instrument of a single control.

Small locomotives are generally equipped with independent brakes only, as these are sufficient to provide for locomotive and any trailing load at the speed and in the service for which the small units are designed. Locomotives for heavy switching, yard, transfer and road work are equipped with both independent and automatic brakes.

The two systems are integrated as much as possible, and a common operator's station of brake-valve pedestal serves both portions of the system. At this pedestal, it is possible to apply (or release) automatic braking to all cars and the locomotive at the same instant; or to apply (or release) the brakes of the locomotive only, regardless of the condition of the train brakes.

Brakes may also be designated as especially adapted for switcher use, road locomotive use, or special high-speed passenger-locomotive use. In Fig. 18-11 is shown brake equipment designed expressly for Diesel switchers. It has the pedestal-type brake valve with accessory devices, such as bell ringer and sander valves, mounted on the pedestal to save cab space and reduce piping to the minimum. The automatic brake-valve portion corresponds to the conventional railroad design used for controlling train brakes. The independent brake valve is of the self-lapping type with which brake-cylinder pres-

Fig. 18-11. Brake pedestal for switching locomotive use.

Courtesy Westinghouse Air Brake Co.

Fig. 18-12. Brake pedestal for road locomotives both freight and passenger.

sure is adjusted quickly by variable positioning of the handle. This provides fast application and release with quick braking pressure graduations in small steps, a feature enhancing the natural flexibility of the Diesel switcher.

Brake equipment designed for Diesel locomotives that operate in road freight and passenger service is shown in Fig. 18-12. The basic design provides for the addition

Courtesy Westinghouse Air Brake Co.

Fig. 18-11. Brake pedestal for switching locomotive use.

Fig. 18-12. Brake pedestal for road locomotives, both freight and passenger.

of required accessory items and control needed to supply "HSC," or high-speed control, for locomotives and cars used in high-speed passenger service. This modification includes: 1. Speed governor control, to adjust braking pressure in accordance with train speed; 2. Electro-pneumatic transmission, providing high brake flexibility by virtue of fast brake application and release; 3. Safety control, providing automatic brake application with power shut off in case the engineer should become incapacitated; and 4. Retarder, or anti-wheel slip, control which momentarily moderates braking pressure by "softening" the brake action on any wheel that starts to slip because of rail conditions.

These supplementary features overcome the delay which would occur in transmitting braking impulses to

the brake operating valves on each car in a long train by merely pneumatic means; promote safety of equipment, personnel and passengers; and correlate braking effort with track conditions and train speed.

TYPICAL BRAKE SYSTEM.—The component parts of air-brake systems generally are best illustrated by a brief description of a combined independent and automatic brake system for a large Diesel switching locomotive.

Air Compressor—The compressor furnishes compressed air for operation of the brakes; brake and power controls, sanders, alarms, etc. The usual compression pressure is 140 lb. per sq. in., but this is reduced as required for the various uses just enumerated. For example, pneumatic portions of the power control system operate on compressed air at about 70 lb. per sq. in. minimum and 80 lb. per sq. in. maximum.

An air compressor for locomotive use is shown in Fig. 18-14. It is a 3-cylinder, air-cooled, compound machine having a relatively large displacement even at engine idling speed. It is suitable for service up to 140 lb. per sq. in., and can be operated at speeds up to 800 r.p.m. This permits the compressor to be direct-connected to the engine crankshaft in most Diesel locomotives. Some locomotives, of course, use belt-driven compressors.

Inasmuch as the locomotive engine continues to operate at idling speed when motive power is temporarily not needed, it is necessary for the air compressor to run continuously. Therefore, a load-and-unload control is provided to maintain air pressure in the main reservoirs between the desired limits. The unloader is customarily adjusted to cut-in at 130 lb. per sq. in. pressure, and to cut-out at 140 lb. per sq. in.

Main Reservoirs—These are the main air-storage tanks, approximately 2 ft. in dia. and 7 ft. long, and are mounted below the main frame or deck plate. Two are usually used. The reservoirs are customarily located so that the connecting piping to the air compressor is as long as possible, to give a large radiating surface. This cools the air and helps precipitate water vapor, which can then be drained off periodically. The reservoirs likewise help in the cooling action.

Engineer's Valve—This term is applied to the mechanism under the actual jurisdiction of the engineer. In this case, it would be the valves necessary to secure independent and automatic braking, mounted in the brake pedestal with required operating levers at convenient height.

Pages 81-82 of the officially transcribed record of oral argument on motion for new trial read as follows:

"Mr. DeLone:

"When this case came on for trial—and I am going outside the record now so that your Honor may know my position exactly; I don't want anything withheld from the Court; you can take it or disregard it as you think appropriate—when this case came on for trial, my associate, Mr. Midgett, told me the witnesses he had told the Claims Department to bring in in this case. I got the memorandum about Mr. Lawlor's behavior in Mr. Richter's office, I got the statements; I looked at them. I also learned and ascertained that Mr. Lawlor himself was a claimant in a case against the railroad, an accident which had occurred in December of 1952. He had a claim himself. And I had learned that in the opinion of a number of people he was not a reliable witness and had expressed great hostility to the railroad. So I told Mr. Midgett that I did not propose to call or use Mr. Lawlor as my witness."